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First Named Inventor	Honda, Kiyoshi
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ENCLOSURES *(Check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
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- ☐ Reply to Missing Parts/ Incomplete Application
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- ☒ Renewed Petition to Make Special
- ☐ Petition to Convert to a Provisional Application
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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Townsend and Townsend and Crew LLP		
Signature			
Printed name	Chun-Pok Leung		
Date	April 8, 2005	Reg. No.	41,405

CERTIFICATE OF TRANSMISSION/MAILING

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PATENT
Attorney Docket No.: 16869P-078800US
Client Ref. No.: 340201691US01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

KIYOSHI HONDA *et al.*

Application No.: 10/663,480

Filed: September 15, 2003

For: VIRTUALIZATION CONTROLLER AND DATA TRANSFER CONTROL METHOD

Customer No.: 20350

Examiner: Unassigned

Technology Center/Art Unit: 2186

Confirmation No.: 2877

RENEWED PETITION TO MAKE SPECIAL FOR NEW APPLICATION UNDER M.P.E.P. § 708.02, VIII & 37 C.F.R. § 1.102(d)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Decision dated March 24, 2005 dismissing the original petition to make special, Applicants respectfully submit a renewed petition to make special the above-identified application under MPEP § 708.02, VIII & 37 C.F.R. § 1.102(d). The application has not received any examination by an Examiner.

(a) The Commissioner has previously been authorized to charge the petition fee of $130 under 37 C.F.R. § 1.17(i) and any other fees associated with this paper to Deposit Account 20-1430.

(b) All the claims are believed to be directed to a single invention. If the Office determines that all the claims presented are not obviously directed to a single invention, then Applicants will make an election without traverse as a prerequisite to the grant of special status.

(c) Pre-examination searches were made of U.S. issued patents, including a classification search and a key word search. The classification search was conducted on or around October 7, 2004 covering Class 711 (subclasses 6, 111, 114, 154, 165, 170, 173, 202, and 203) and Class 718 (subclass 1), by a professional search firm, Lacasse & Associates, LLC. The key word search was performed on the USPTO full-text database including published U.S. patent applications. The inventors further provided five references considered most closely related to the subject matter of the present application (see references #6-10 below), which were cited in the Information Disclosure Statement filed with the application on September 15, 2003.

(d) The following references, copies of which were previously submitted, are deemed most closely related to the subject matter encompassed by the claims:

(1) U.S. Patent No. 6,647,387 B1;

(2) U.S. Patent No. 6,718,404 B2;

(3) U.S. Patent Publication No. 2003/0204700 A1;

(4) U.S. Patent Publication No. 2004/0054866 A1;

(5) U.S. Patent Publication No. 2004/0068637 A1;

(6) U.S. Patent No. 5,680,640;

(7) U.S. Patent Publication No. 2001/0054133 A1;

(8) Japanese Patent Publication No. JP 2001-249853;

(9) Japanese Patent Publication No. JP 2001-331355 (U.S. 09/991,219); and

(10) European Patent Publication No. EP 1130514 A2.

(e) Set forth below is a detailed discussion of references which points out with particularity how the claimed subject matter is distinguishable over the references.

A. Claimed Embodiments of the Present Invention

The claimed embodiments relate to transferring data between a plurality of storage devices without a host computer issuing an access request to a storage device being aware of the data transfer process.

Independent claim 1 recites a virtualization controller for controlling data transfer between a host system and a plurality of storage devices. The virtualization controller comprises a plurality of first ports for connection with the plurality of storage devices each having a storage area to store data; a second port for connection with the host system; a processor; and a memory configured to store volume mapping information which correlates first identification information used by the host system to access a first storage area in one of the storage devices, with second identification information for identifying the first storage area, the correlation being used by the processor to access the first storage area. When data stored in the first storage area is transferred to a second storage area in one of the storage devices, the processor correlates the first identification information with a third identification information for identifying the second storage area and registers the first identification information and the third identification information in the volume mapping information.

Independent claim 10 recites a data control system connected to one or more host systems. The data control system comprises a plurality of storage devices each having a storage area; and a switch which is connected with the plurality of storage devices and the one or more host systems. The switch includes a plurality of first ports for connection with the storage devices; one or more second ports for connection with the one or more host systems; a memory configured to store information on a correlation between first identification information used by the host system to access a first storage area of one of the storage devices, and second identification information for identifying the first storage area; and a routing processor configured to convert data with the first identification information received from the host system into data with the second identification information and to send the converted data to the storage device having the first storage area according to the correlation information. When data stored in the first storage area is transferred to a second storage area of one of the storage devices, the routing processor converts data with the first

identification information into data with third identification information for identifying the second storage area and sends the converted data to the storage device having the second storage area.

Independent claim 16 recites a method of controlling data transfer in a system including a host system which uses first identification information to access a first storage area in one of a plurality of storage devices, wherein the first storage area includes data associated with second identification information identifying the first storage area. The method comprises issuing a data transfer request to the first storage device to transfer the data with the second identification information in the first storage device to a second storage device; and upon receipt of notification of completion of data transfer from the first storage device to the second storage device, correlating the first identification information with a third identification information identifying the second storage area containing the transferred data.

Independent claim 19 recites a method of connecting a virtualization controller between a host system and a storage device which are connected through a first path between a first port of the host system and a first port of the storage device and a second path between a second port of the host system and a second port of the storage device. The method comprises accessing a storage area of the storage device; disconnecting the second path between the second port of the host system and the second port of the storage device; connecting the second port of the host system with the virtualization controller through a third path; connecting the virtualization controller with the second port of the storage device through a fourth path; and setting, on the virtualization controller, identification used by the host system to identify the storage area, identification information for the second port of the storage device, and virtual port identification information for the virtualization controller, which are correlated to define access of the storage area by the host system.

Independent claim 24 recites a method of controlling data transfer in a system including a host system which uses first identification information to access a first storage area in one of a plurality of storage devices, wherein the first storage area includes data associated with second identification information identifying the first storage area. The method comprises receiving a first request with the first identification information from the host system to access the data associated with the second identification information

identifying the first storage area; sending a second request with the second identification information to the first storage area; receiving data corresponding to the second request from the first storage area; and sending the received data to the host system.

One of the benefits that may be derived is that data can be transferred between storage devices without revising the identification information which a host computer uses to identify the volume to be accessed. As a consequence, data transfer takes place without stopping operation of the host computer. Furthermore, even when a virtualization controller is newly introduced or replaced in a computer system, a host computer can access data without revising the information for identifying the volume to be accessed. As a consequence, it is possible to introduce or replace a virtualization controller in the computer system without stopping operation of the host computer.

B. Discussion of the References

None of the following references disclose, in transferring data stored in a first storage area to a second storage area, correlating the first identification information (used by the host system to access a first storage area) with a third identification information for identifying the second storage area containing the transferred data. For instance, independent claim 1 recites that when data stored in the first storage area is transferred to a second storage area in one of the storage devices, the processor correlates the first identification information with a third identification information for identifying the second storage area and registers the first identification information and the third identification information in the volume mapping information. Independent claim 10 recites, when data stored in the first storage area is transferred to a second storage area of one of the storage devices, the routing processor converts data with the first identification information into data with third identification information for identifying the second storage area and sends the converted data to the storage device having the second storage area. Independent claim 16 recites, upon receipt of notification of completion of data transfer from the first storage device to the second storage device, correlating the first identification information with a third identification information identifying the second storage area containing the transferred data.

Independent claim 19 also recites correlation of identification information for accessing storage area by the host system, which is not taught by the references. More

specifically, the references do not disclose setting, on the virtualization controller, identification used by the host system to identify the storage area, identification information for the second port of the storage device, and virtual port identification information for the virtualization controller, which are correlated to define access of the storage area by the host system.

Claim 24 also involves correlation of identification information for accessing storage area by the host system. The references fail to disclose a method of controlling data transfer in a system including a host system which uses first identification information to access a first storage area in one of a plurality of storage devices, wherein the first storage area includes data associated with second identification information identifying the first storage area, as recited in independent claim 24. More specifically, the references do not disclose sending a second request with the second identification information to the first storage area; receiving data corresponding to the second request from the first storage area; and sending the received data to the host system. In claim 24, the correlation of identification information for accessing storage area by the host system involves correlation of the first identification information used by the host system to access data and the second identification information identifying the first storage area and being associated with the data.

1. U.S. Patent No. 6,647,387 B1

This reference discloses a controller 114 which may be connected across local I/O interface 134 to memory 138 and port 136, controller 114 also appears to contain a processor 132. Processor 132 may fetch and execute computer program instructions and data from memory 138. Such computer program instructions and data may include, controller SAN management procedure 140 and controller port ID/LU mapping table 142. See Fig. 4; column 5 lines 32-33, lines 66-67; and column 6 lines 1-3.

The reference does not teach a method of correlating storage identifiers upon data transfer. As such, it does not disclose, in transferring data stored in a first storage area to a second storage area, correlating the first identification information (used by the host system to access a first storage area) with a third identification information for identifying the second storage area containing the transferred data, as recited in independent claims 1, 10, and 16. There is no teaching of setting, on the virtualization controller, identification used by the host

system to identify the storage area, identification information for the second port of the storage device, and virtual port identification information for the virtualization controller, which are correlated to define access of the storage area by the host system, as recited in independent claim 19. Nor is there teaching of sending a second request with the second identification information to the first storage area, which is associated with a first identification information from the host system to access data; receiving data corresponding to the second request from the first storage area; and sending the received data to the host system, as recited in independent claim 24.

2. U.S. Patent No. 6,718,404 B2

This reference discloses a controller 120, which may store mapping table 200 in a semi-permanent memory. Mapping table 200 may contain a mapping that relates position in a virtual disk with an actual location on storage devices. Data migration may be done in response to an automated policy decision to move virtual disk data from one physical storage location 230 to another. Controller 120 may copy contents of existing physical storage location 230 to a new physical location 230. The controller 120 may then update its persistently stored mapping table 200 to reflect the new storage location 230. See Fig. 1; column 2, lines 3-5 and lines 64-67; column 7, lines 17-19; and column 7, line 61 to column 8, line 4.

Controller 120 does not appear to have direct port connections to the hosts or the storage devices. Moreover, the reference does not teach a method of correlating storage identifiers upon data transfer. As such, it does not disclose, in transferring data stored in a first storage area to a second storage area, correlating the first identification information (used by the host system to access a first storage area) with a third identification information for identifying the second storage area containing the transferred data, as recited in independent claims 1, 10, and 16. There is no teaching of setting, on the virtualization controller, identification used by the host system to identify the storage area, identification information for the second port of the storage device, and virtual port identification information for the virtualization controller, which are correlated to define access of the storage area by the host system, as recited in independent claim 19. Nor is there teaching of sending a second request with the second identification information to the first storage area, which is associated with a first identification information from the host system to access data; receiving data

corresponding to the second request from the first storage area; and sending the received data to the host system, as recited in independent claim 24.

3. U.S. Patent Publication No. 2003/0204700 A1

This reference relates to a controller 6 which may maintain a virtual storage map that describes current allocations of primary storage volume 12 and secondary virtual storage 14 within storage 8. Controller 6 may store the VPD map and VSM information within both memory 22 and storage system 8 for purposes of redundancy. In response to save/backup request, controller 6 updates VSM to include data written to secondary volume. See paragraph [0053] and Fig. 3.

The reference merely relates to the use of a virtual physical drive map that maps the virtual physical derives to storage media of the physical storage devices. It does not, however, teach a method of correlating storage identifiers upon data transfer. As such, it does not disclose, in transferring data stored in a first storage area to a second storage area, correlating the first identification information (used by the host system to access a first storage area) with a third identification information for identifying the second storage area containing the transferred data, as recited in independent claims 1, 10, and 16. There is no teaching of setting, on the virtualization controller, identification used by the host system to identify the storage area, identification information for the second port of the storage device, and virtual port identification information for the virtualization controller, which are correlated to define access of the storage area by the host system, as recited in independent claim 19. Nor is there teaching of sending a second request with the second identification information to the first storage area, which is associated with a first identification information from the host system to access data; receiving data corresponding to the second request from the first storage area; and sending the received data to the host system, as recited in independent claim 24.

4. U.S. Patent Publication No. 2004/0054866 A1

This reference discloses a storage controller 27, which may include a plurality of port adapters 35, 36. Port adapter 36 may include a microprocessor 235 and random access memory 236. Random access memory 236 may be programmed with volume access and mapping information 246. The volume access and mapping information may include a

virtual port host table 281 listing each host having access rights through a virtual switch controlled with the volume access and mapping information, and a virtual port mapping table 282 listing each virtual port accessible through the virtual switch controlled with the volume access and mapping information. See Figs. 21 and 23; and paragraphs [0059], [0126], [0128], and [0139].

The reference merely relates to the use of a virtual port mapping table, but does not teach a method of correlating storage identifiers upon data transfer. As such, it does not disclose, in transferring data stored in a first storage area to a second storage area, correlating the first identification information (used by the host system to access a first storage area) with a third identification information for identifying the second storage area containing the transferred data, as recited in independent claims 1, 10, and 16. There is no teaching of setting, on the virtualization controller, identification used by the host system to identify the storage area, identification information for the second port of the storage device, and virtual port identification information for the virtualization controller, which are correlated to define access of the storage area by the host system, as recited in independent claim 19. Nor is there teaching of sending a second request with the second identification information to the first storage area, which is associated with a first identification information from the host system to access data; receiving data corresponding to the second request from the first storage area; and sending the received data to the host system, as recited in independent claim 24.

5. U.S. Patent Publication No. 2004/0068637 A1

This reference discloses a controller 12 which may include a central processing unit (CPU) 16 and a memory 18. Memory 18 may be utilized to store maps, for use in addressing storage space 14 and store executable code usable controller 12. Controller 12 may initiate a data migration request, and may modify pointer 34 associated with data migration request, using new physical address 36, so now pointer 34 addresses the migrated data at modified address 36. See Fig. 1; and paragraphs [0020], [0022], [0059], and [0060].

The reference is merely directed to activating and deactivating pointers that associate virtual storage locations with physical storage locations. It does not, however, disclose a method of correlating storage identifiers upon data transfer. As such, it does not

disclose, in transferring data stored in a first storage area to a second storage area, correlating the first identification information (used by the host system to access a first storage area) with a third identification information for identifying the second storage area containing the transferred data, as recited in independent claims 1, 10, and 16. There is no teaching of setting, on the virtualization controller, identification used by the host system to identify the storage area, identification information for the second port of the storage device, and virtual port identification information for the virtualization controller, which are correlated to define access of the storage area by the host system, as recited in independent claim 19. Nor is there teaching of sending a second request with the second identification information to the first storage area, which is associated with a first identification information from the host system to access data; receiving data corresponding to the second request from the first storage area; and sending the received data to the host system, as recited in independent claim 24.

6. U.S. Patent No. 5,680,640

This reference discloses a system and method for providing on-line, real-time, transparent data migration from a first data storage system to a second data storage system. The first data storage system which had previously been coupled to a host, network or other data processing system is disconnected from the host and connected to a second data storage system. The second data storage system is coupled to the host or data processing system. The second data processing system includes a data map or table which indicates which data elements are stored on the second data storage system and which corresponding data elements on the first data processing device have been copied to the second data storage system. When the host, network or data processing system requests data from a data storage system, the second data storage system determines whether or not the data is stored on the second or first data storage system. If the data is stored on the second data storage system, the data is made available to the requesting device. If the data is not stored on a second data storage system, the second data storage system issues a request to the first data storage system, retrieves the data, makes the data available to the requesting device, writes the data to the second data storage system and updates the data element map or table. When not busy servicing other requests, the second data storage system scans the data map or table to determine which data elements from the first data storage device have not been copied to the second data storage device, and performs copying of the data and updating of the data map or

table in the background, independent of any coupled host, network or other similar data processing device.

The reference allows the data migration among the disk apparatuses to be implemented unlimitedly transparently to the users. However, this is the data migration method where the for-mainframe-designed disk apparatuses are assumed, and thus this method is inapplicable to SAN. In the for-mainframe-designed disk apparatuses as disclosed in the reference, when replacing an old disk apparatus by a new disk apparatus, the setting on the disk apparatus side makes it possible to make the new disk apparatus look as if it were the old disk apparatus when seen from the host side. This is made possible by manipulating the setting of device numbers or the like of the disk apparatuses. However, in SAN, especially in the case of, e.g., the Fibre Channel environment, the individual unique IDs assigned to the individual disk apparatuses are determined by the negotiation among the appliances (i.e., the disk apparatuses, and a fibre channel switch) included in the network. Accordingly, the setting made by the users never changes the IDs. This condition, when using the data migration method in the reference, makes it impossible to make the new disk apparatus disguise the old disk apparatus with respect to the host computers. Consequently, in reality, it is impossible to implement the data migration that is transparent to the hosts and the users.

Further, the reference is merely directed to data migration based on the status of a data element map. It does not teach, however, a method of correlating storage identifiers upon data transfer. As such, it does not disclose, in transferring data stored in a first storage area to a second storage area, correlating the first identification information (used by the host system to access a first storage area) with a third identification information for identifying the second storage area containing the transferred data, as recited in independent claims 1, 10, and 16. There is no teaching of setting, on the virtualization controller, identification used by the host system to identify the storage area, identification information for the second port of the storage device, and virtual port identification information for the virtualization controller, which are correlated to define access of the storage area by the host system, as recited in independent claim 19. Nor is there teaching of sending a second request with the second identification information to the first storage area, which is associated with a first identification information from the host system to access data; receiving data corresponding

to the second request from the first storage area; and sending the received data to the host system, as recited in independent claim 24.

7. U.S. Patent Publication No. 2001/0054133 A1

This reference discloses a technique for efficient data transfer concerning a system in which a volume used by an application is provided over a plurality of storage areas which are controlled by different controllers. According to this technique, data in a volume which is used by a specific application is transferred preferentially. Data transfer in a storage device subsystem is executed by a controller which controls the storage device subsystem, and the controller can hide the data transfer process from a host computer connected with it. However, this method does not take into consideration data transfer which takes place over more than one storage device subsystem. Therefore, if data stored in a certain storage device subsystem is to be transferred to another storage device subsystem, the controller must inform the host computer that, in data transfer, the storage device subsystem to be accessed will change, which means that it is impossible to hide the data transfer process from the host computer. Also, this reference does not disclose any technique of hiding such data transfer process from the host computer. Consequently, for data transfer, the host computer must stop its operation once and specify the storage device or volume to be accessed again.

As discussed in the present application at pages 1 and 2, the reference discloses a technique for efficient data transfer concerning a system in which a volume used by an application is provided over a plurality of storage area which are controlled by different controllers. According to this technique, data in a volume which is used by a specific application is transferred preferentially. Data transfer in a storage device subsystem is executed by a controller which controls the storage device subsystem, and the controller can hide the data transfer process from a host computer connected with it. However, this method does not take into consideration data transfer which takes place over more than one storage device subsystem. Therefore, if data stored in a certain storage device subsystem is to be transferred to another storage device subsystem, the controller must inform the host computer that, in data transfer, the storage device subsystem to be accessed will change, which means that it is impossible to hide the data transfer process from the host computer. Also, the reference does not disclose any technique of hiding such data transfer process from the host

computer. Consequently, for data transfer, the host computer must stop its operation once and specify the storage device or volume to be accessed again.

The reference does not teach a method of correlating storage identifiers upon data transfer. As such, it does not disclose, in transferring data stored in a first storage area to a second storage area, correlating the first identification information (used by the host system to access a first storage area) with a third identification information for identifying the second storage area containing the transferred data, as recited in independent claims 1, 10, and 16. There is no teaching of setting, on the virtualization controller, identification used by the host system to identify the storage area, identification information for the second port of the storage device, and virtual port identification information for the virtualization controller, which are correlated to define access of the storage area by the host system, as recited in independent claim 19. Nor is there teaching of sending a second request with the second identification information to the first storage area, which is associated with a first identification information from the host system to access data; receiving data corresponding to the second request from the first storage area; and sending the received data to the host system, as recited in independent claim 24.

8. Japanese Patent Publication No. JP 2001-249853

This reference discloses a data migration method suitable for SAN environment and its devices. A disk device at migration destination is connected with a switch in which a host is connected with a disk device at a migration origin. At this memory, the same value as that of a port ID provided to an F-Port of the switch is provided to a port ID of the disk device at the migration destination and the disk device at the migration destination is made not to be recognized by the host 101. The disk information at the migration destination reads the constitutional information on the disk device at the migration origin. After that, a physical port ID 602 of the disk device 103 at the migration origin is replaced with the physical port ID 602 of the disk device 104 at the migration destination in the switch. The disk device at the migration destination constructs volume according to a logical volume number on the disk device at the migration origin and the size of the volume and stores data in the disk device at the migration origin in corresponding volume.

The reference discloses a data migration method which involves replacing the physical port ID at the migration origin with the physical port ID at the migration destination in the switch. It does not teach a method of correlating storage identifiers upon data transfer. As such, it does not disclose , in transferring data stored in a first storage area to a second storage area, correlating the first identification information (used by the host system to access a first storage area) with a third identification information for identifying the second storage area containing the transferred data, as recited in independent claims 1, 10, and 16. There is no teaching of setting, on the virtualization controller, identification used by the host system to identify the storage area, identification information for the second port of the storage device, and virtual port identification information for the virtualization controller, which are correlated to define access of the storage area by the host system, as recited in independent claim 19. Nor is there teaching of sending a second request with the second identification information to the first storage area, which is associated with a first identification information from the host system to access data; receiving data corresponding to the second request from the first storage area; and sending the received data to the host system, as recited in independent claim 24.

9. Japanese Patent Publication No. JP 2001-331355 (U.S. 09/991,219)

This reference discloses a system that is transparent to the hosts and the users, and that is capable of making full utilization of the scalability of SAN. The computer system includes host computers, a back end computer (back end server), a plurality of storage subsystems, and a switch for connecting at least the host computers with the back end computer. The host computers access each storage subsystem via the back end computer. The back end computer provides one virtual disk apparatus or a plurality of virtual disk apparatuses to the host computers. If the host computers issue access requests to the virtual disk apparatus/apparatuses, the back end computer issues an appropriate request to the storage subsystems connected thereto actually, depending on the type of the virtual disk apparatus/apparatuses to which the requests have been issued. This makes it possible to implement all the data manipulations, such as the data migration among the disk apparatuses and on-line extension of the disk capacities, completely transparently to the host computers.

In this reference, the back end computer provides one virtual disk apparatus or a plurality of virtual disk apparatuses to the host computers. If the host computers issue

access requests to the virtual disk apparatus/apparatuses, the back end computer issues an appropriate request to the storage subsystems connected thereto actually, depending on the type of the virtual disk apparatus/apparatuses to which the requests have been issued.

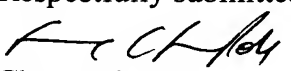
The reference is directed to the use of a back end computer to provide one or more virtual disk apparatuses to the host computers. It does not teach a method of correlating storage identifiers upon data transfer. As such, it does not disclose , in transferring data stored in a first storage area to a second storage area, correlating the first identification information (used by the host system to access a first storage area) with a third identification information for identifying the second storage area containing the transferred data, as recited in independent claims 1, 10, and 16. There is no teaching of setting, on the virtualization controller, identification used by the host system to identify the storage area, identification information for the second port of the storage device, and virtual port identification information for the virtualization controller, which are correlated to define access of the storage area by the host system, as recited in independent claim 19. Nor is there teaching of sending a second request with the second identification information to the first storage area, which is associated with a first identification information from the host system to access data; receiving data corresponding to the second request from the first storage area; and sending the received data to the host system, as recited in independent claim 24.

10. European Patent Publication No. EP 1130514 A2

This reference contains the same disclosure as reference #8, Japanese Patent Publication No. JP 2001-249853.

(f) In view of this petition, the Examiner is respectfully requested to issue a first Office Action at an early date.

Respectfully submitted,



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